NOTES

1. Papers selected for inclusion in General Sessions will be available at the Conference in the following official languages of the United Nations: English, French, Russian and Spanish.

2. Papers selected for inclusion in Specialized Sessions will be available at the Conference in only one of the above official languages.

3. Summaries of all papers, as submitted by contributors, will be available at the Conference in the following official languages of the United Nations: English, French, Russian and Spanish.

4. Papers and summaries will not be available for general distribution in advance of the Conference. They will be published in advance in limited quantities only for the use of delegations of participating governments and of other authorized participants. Post-Conference publication and general distribution of the Conference Proceedings will follow United Nations practices as laid down by the United Nations Publications Board.

HYDROLOGICAL SERVICES IN THE UAR

by
H.K. Fahmy (M.Sc.)
Director General Nile Control
M.F. Taha (B.Sc., D.I.C.)
Director General Meteorological Department
M.L. El-Ebrashy (B.Sc.)
Assistant Under-secretary, Ministry of Works

PART I.

ORGANIZATION OF METEOROLOGICAL SERVICE

Application of Meteorology for Economical and Industrial Development in the Country:

1. The role of meteorology in the economic developments in the country is becoming more and more important with the application of science and technology for this economic department. It would suffice to illustrate this importance to note that the ECOSOC has drawn the attention of Governments, in its resolution 829(XXXII) to the importance of the establishment of networks of meteorological stations to the economic development of countries. The experience of the UAR in the application of meteorology to the projects of the economic development plan of the country has proved that such an application is an important factor in the achievements of the plan. Many examples can be quoted to demonstrate this fact, the most important of which are the applications of meteorology in the fields of Aviation, Agriculture, Shipping, Development of Water Resources ..... etc.

2. Thus it must be accepted as an established fact in all developing countries, that the establishment of a Meteorological Service is an important point of the Economic Development plan of the Country. First priority should be given to the development of networks of meteorological stations which must start as a matter of urgency because any meteorological study has to be based on accumulated data obtained by those stations over the largest possible period.

The Unification of Meteorological Service under One Administration:

3. The experience of the UAR in organizing meteorological activities has proved that it is essential to have all meteorological activities in the country undertaken by one Administration.

4. Prior to 1947 there were two Meteorological Services in the UAR, the first one under the Ministry of Public Works, the second under the Civil Aviation Department. This situation has led to inefficiency and inconsistency in the provision of meteorological services to various purposes. Such a division of efforts leads also to slow department.

5. In 1947 those two Services were amalgamated together into one Administration VIZ the Meteorological Department, which was made responsible for all meteorological activities in the Country This unification has enabled the Department to develop progressively since that time and to improve the services which it provides to all users of meteorology.

Technical and Administrative Orgnization of the Meteorological Services:

6. The organization of the Meteorological Department of the UAR comprises a Director General, assisted by a Deputy Director General and Directors of the following main Divisions: - Climate Division, Forecasting Division, Stations and Methods of Observations Division, Technical Affairs Division, Telecommunications Division and an Administrative Division.

7. Our experience in this Organization of the Meteorological Department has revealed the following points:

(a) The establishment of a Technical Affairs Division separate from the other specialized technical divisions has proved to be most useful in conducting all the technical activities of the Department in a concerted and coordinated manner. This division is responsible interalia for following up the implementation of international resolutions and recommendations in the field of Meteorology in the UAR. This fact ensures the development of the technical activities of the Department in the right directions and enables it to fulfil its contribution to International Meteorology in an efficient manner.

(b) The need has demonstrated itself for organizing research work in the Meteorological Department. A careful study has been made of this requirement. One solution would be to let every technical division undertake its own research work. This solution has the disadvantage that the meteorologists working in these divisions are overloaded with their operational duties and that there would be no coordination in the research work undertaken by various divisions. On the other hand if a special division is established solely for research work, the research work will be isolated from the practical day-to-day applications which is a disadvantage. The solution reached by the Meteorological Department of the UAR is to establish a Meteorological Institute for research and training as a part of the Meteorological Department, with the assistance of the UN Special Fund. The Organization of this Institute will be such as to provide a continuous flow of meteorologists and knowledge between this Institute and the Technical Divisions of the Department at all levels. In order to activate and encourage research work, a programme of scientific lectures is organised periodically where meteorologists get together and listen to and discuss together results of their own research work or investigations.

(c) Under the present organization, the activities of the Department in the fields of agrometeorology and meteorological instruments are both under the Stations and Methods of Observation Division. Experience has shown that this is not an efficient manner to conduct the activities of the Department in these two important fields, and that it is necessary to establish a separate Division for each of these two branches. The Meteorological Department will start immediately by establishing a special Division for Agrometeorology due to its direct importance to the economic development of the country in the Sector of Agriculture.

(d) It should be the responsiblity of the Meteorological Department solely to undertake meteorological instructions and training to Pilots and all other persons requiring such training e.g. agriculturists, sea men ... etc. This includes laying down syllabli, delivering lectures and training, examinations ... etc. within the framework of standards and Recommended Practices laid down for this purpose by WMO & ICAO or other International Bodies.

Selection of Networks of Meteorological Observing Stations for Different Purposes:

8. The number and distribution of meteorological observing stations of different types should be determined in the light of the provisions of the WMO Technical Regulations and the national considerations concerning the need and practicability of having certain stations at certain places.

9. The establishment of such stations far from inhabited areas where means of living and transport are inadequate gives rise to some difficulties which have to be studied and solved on the basis of local conditions. No one solution can be recommended for general application in all such cases. The Meteorological Department has undertaken, as one of the measures of solving these difficulties to provide housing facilities for the staff working in such stations.

10. The equipment required for each type of meteorological observing stations can be determined with the help of the WMO Guide to Meteorological instruments. There are several manufacturers in different countries for each type of equipment. The choice of the manufacturer from whom the equipment should be ordered depends on many factors some of which are technical concerning the specifications of the instruments and their suitability for certain climatic conditions, and some are non technical such as the availability of currency involved. Developing countries should benefit from the experience of their neighbouring countries with similar climate in the choice of their meteorological instruments and should endeavour to use the same instruments as in adjacent countries. This would facilitate arrangements for training and for obtaining spare parts. The most important point which should be taken care of in this respect is the provision of proper training of personnel on the installation, operation and maintenance of such equipment. This could be done by the means of expert missions and/or fellowships.

11. It has been found necessary to establish a workshop for meteorological instruments for the maintenance, reparation, calibration and standardization of meteorological instruments.

Standards, Qualifications and Training of Field Personnel:

12. The Meteorological Department of the UAR requires the following standards for qualifications and training for each category of meteorological personnel:

(a) Meteorological Observers;

(i) Surface and Pilot Balloon Observers: Secondary School Certificate and a 6 months training course in the Training Centre of the Meteorological Department.

(ii) Radiosonde and Radiowind Observers: Same Qualifications and training as for previous category and an additional training in electronics of six months or more depending on the qualifications, experience and ability of the trainees.

(iii) Agrometeorological Observers: Same qualifications and training as for (a) above and an additional training in the field for few months.

(b) Meteorologists / Forecasters: A university degree (B.Sc.) in Physics and/or Mathematics and a post graduate course of one year in Meteorology. Additionally, training in the job for few months is required.

13. An important point which the Meteorological Department wishes to underline in the light of its experience is that it is indispensable that the meteorologists/forecasters be university graduates. It is dangerous to accept any lower standard for this category which is responsible for highly scientific work on which depends the safety of life and property.

14. Another point which should be given careful consideration by developing countries is the choice of training centres or universities to which they should send their personnel for training. This depends on many factors some of which are technical concerning the standard of the training given in each of these centres or universities; others are non technical such as the languages facilities available. The WMO Publication on training facilities in various countries is very useful in this respect.

Recruitment of Meteorological Personnel in Sufficient Number and of the Required Standards:

15. The experience of the Meteorological Department in the UAR as well as in most other countries has shown very clearly that, as a career, meteorological work, at all levels, is unattractive when compared with others requiring similar qualifications. This is due to the special conditions in meteorological work particularly shift work and work on official public holidays. As a result, difficulties were experienced in most countries to recruit meteorological personnel and also what is even more important, experienced personnel are tempted to leave their posts in Meteorological Services to other more rewarding and less burdensome occupations.

16. This difficulty has been recognized by ICAO and WMO. A joint meeting of those two Organizations for Aeronautical Meteorology in 1954 has issued a recommendation inviting action to solve this difficulty.

17. In the UAR a special allowance has been decided for all levels of meteorological personnel in the hope that this may take meteorological work more attractive.

18. In view of the long training required for all categories of meteorological personnel care should be taken to recruit an adequate number of personnel based on a careful planning of future developments and needs.

Coordination between the Meteorological Services and other National Agencies requiring Meteorological Help and Advice:

19. The nature and scope of the machinery by which meteorological services required by any National Agency are to be provided, depend on the volume of the services required. In important fields such as aviation and agriculture it is necessary to establish special sections in the Meteorological Department to deal with their requirements. In addition , it is sometimes necessary to establish a permanent committee comprising representatives of meteorology

and the agency requiring meteorological services; such a committee would be responsible for laying down policy to be followed in the provision of meteorological services in the agency concerned.

20. In the AUR, such a committee exists for Agrometeorological Activities. For meteorological services to aviation, there is a special section of the Meteorological Department responsible for this particular aspect. This section maintains close contact with aeronautical personnel.

21. For other cases where the meteorological services required are not voluminous, it would suffice for organizing the provision of such services to have occasional meetings or contacts between the people concerned. The arrangements which are thus agreed upon would be executed by the Meteorological Offices for general purposes.

Policy Recommended for the Running and Operation of a Meteorological Telecommunications Network:

22. Meteorological observations taken at any place cannot be useful unless they are promptly disseminated to all Meteorological Offices collecting such observations for analysis and preparation of forecasts.

23. Thus the establishment of an adequate telecommunications network for the rapid collection and dissemination of meteorological observations is an indispensible requirement in meteorological activities.

24. The first step in organizing such a telecommunications network is the establishment of an internal network of telecommunications over which reports of observations taken at individual stations in the country could be collected in the national centre of the country. This internal network could comprise direct telephone, W/T circuits, L/L circuits, LTT circuits. It is not necessary that all such circuits be exclusive for the collection of meteorological observations; common users circuits can also be relied upon.

25. The second step is to organize a national meteorological broadcast by W/T or RTT in accordance with the specifications laid down by the WMO. The purpose of this broadcast is to transmit the collective observations of all the country to adjacent countries and to the sub-continental centres to which the WMO has assigned the responsibility of collecting the national broadcasts in a specified area and retransmitting them by RTT with a higher power for the benefit of more distant countries.

26. The World Wide Organization of meteorological Broadcasts comprises not only the two above mentioned types of broadcasts (National and Sub-Continental), but also Continental and Hemispherical Broadcasts. The purpose of the Continental Broadcast is to transmit collective reports pertaining to a whole Region to neighbouring region. The Hemispherical Broadcasts are responsbile for the collection and dissemination of meteorological data required for the preparation of Hemispherical Charts.

27. National Broadcasts or other alternative means for disseminating national collective reports are arranged by each country. The countries responsible for other types of broadcasts are designated by the WMO.

28. In addition to this broadcasting system, there exists certain Point-to-point network of RTT W/T circuits between countries in one Region and between countries in different Regions to supplement the broadcasting system.

29. The experience of the Meteorological Department of the UAR has shown that the best manner to organize meteorological telecommunications is to entrust its technical aspects to the State Administration responsible for telecommunications; the administration aspects to be undertaken by the Meteorological Department.

The most fruitful use of UNEPTA and the UN Special Fund in the field of Meteorology:

30. The Meteorological Department of the UAR has derived much benefit from the UNEPTA, by obtaining the services of number of experts and grants of fellowships to a number of meteorologists of the Department.

31. Such assistance would be most useful when it is carefully planned and executed. The most important experience that should be pointed out in this connection is the necessity of appointing a counterpart (from the country) to any expert who is appointed in the country. This counterpart should be prepared to take over from the expert, all his responsibilities at the end of his mission. Without this counterpart, the services of any expert can be of no value at the end of his mission. Great stress should be made to train the maximum possible number of nationals while the expert is in the country. It should also be mentioned that expert missions should have a limited period. It has been expressed by the WMO Executive Committee that normally expert missions to one country should be terminated within five years unless special circumstances required and justify prolongation beyond that period.

32. The efforts of experts provided under the UNEPTA should be devoted solely to training local personnel and they should undertake no operational work. For help in operational duties Developing Countries may benefit from the OPEX scheme of the United Nations whereby they can obtain services of experts especially for operational duties.

33. The value of training seminars which are frequently organized under the UNEPTA is very great. Our experience has shown that the meteorologists who attend such seminars increase considerably their knowledge and skill in their respective fields.

34. As for the UN Special Fund, the Meteorological Department did not yet start execution of any projects with its assistance. The only experience it has is in the planning of a project for the establishment of a Meteorological Institute, with the assistance of the Special Fund, as of a part of the Economic Development Plan of the Country.

PART II.

ORGANIZATION OF HYDROLOGICAL SERVICE

General Organization:

35. Some of the activities of this service have given under A.3. 2.1., the staff should consist of three categories:

(a) University graduates in civil engineering with special training in hydrology form the 1st category staff. The terms given to the posts will be those used in the UAR. The inspector should have at least 15 years experience and undertakes the general supervision. The deputy looks after the personnel and assists the inspector in the technical matters. The director of works - 10 years

experience - supervises the field and office work and directs the research through two assistants who, also undertakes the checking of all records and observations. The junior engineer should be qualified for field observations including; first order surveying, checking of gauge; discharge observations; silt sampling and rating current meters. The UAR will be willing to undertake the training of any staff.

(b) Computers: Secondary School graduates with sound mathematical training or technical school graduates. One group undertakes: entry of gauges, checking and computation; the second for checking discharge sheets, entry and computations.

(c) Draftsmen and administrative staff will be as local requirements.

Hydrological Service:

36. This service should consist of the following:

(a) Gauge Office: Receives the more important gauge reading by wire. The reading of remote and less important sites as well. Before entry into register all gauges are plotted on diagram to detect any mistakes. The correct readings are entered into 3 different registers kept by 3 different computers: 56-day, 10-day and monthly means are computed and checked on the three registers. They will then be ready for publications.

(b) Discharge Office: For the important station discharge observation results are wired. These are used for urgent work such as forecasts. Discharge sheets are later checked and a gauge-discharge curve is plotted for every station. From means of gauges, corresponding discharges are read on this curve. 10-day monthly means and yearly totals are published.

(c) Forecasting Office: This undertakes forecasting of river supply and flood stages from the above data collected. Forecasts are used for filling and emptying of reservoirs and distribution of natural supply plus storage.

(d) Rainfall and evaporation Office: Field data are received in the form of monthly and half monthly returns showing the amount and the number of rainy days. Data published consists of monthly and yearly totals and number of rainy days.

(e) Laboratory: A small laboratory may be useful to find out the quantity of suspended matter and the mechanical analysis of samples for the study of silt transportation and scouring and silting in reservoirs and river channel.

PART III.

CO-ORDINATION BETWEEN THE METEOROLOGICAL AND HYDROLOGICAL SERVICES

The Importance of Cooperation and Coordination between the Meteorological and Hydrological services in Problems of Common between Hydrology and Meteorology:

37. The common grounds between Hydrology and Meteorology cover parameters such as precipitation, evaporation, humidity, temperature, evapotranspiration, soil moisture. Those meteorological parameters

are required in the study of the hydrological cycle and their evaluation is essential in water resource studies. Thus it is essential to maintain coordination and cooperation between the hydrological and Meteorological services to ensure satisfying the requirements of both services. The absence of such a co-ordination would lead to duplication of efforts and non-homogenity in distribution of observing stations, instruments used and methods of observations, which would mislead technical studies in both science.

38. There is a certain philosophy that such a coordination is best provided for, by bringing Hydrology and Meteorology together under one Department. Experience has shown that this is not a good arrangement; it lowers the level of activities in both branches. The required co-ordination can be very well ensured by maintaining close liaison between the two Services which would take form of periodical joint meetings or a permanent Committee.

Ways and Means of Provision of Meteorological Data for Hydrology with Special References to the Exchange of Data and Network Design:

39. The design of networks for the measurement and study of those parameters in the hydrological cycle which involve meteorological considerations, including the desirable spatial distribution of stations and the time interval between observations for various purposes, have to be studied in the light of the hydrological requirements for those parameters. The Hydrological Service would state its requirements whereas the Meteorological Service would provide advice on the location of stations and undertake the execution of the networks.

40. The extent to which the exchange of data required for hydrological purposes varies from one country to another according to the scope and nature of the hydrological problems of the country.

41. In the UAR, where the main hydrological problems are those related to the River Nile, it is important to exchange data between countries on the River. The Meteorological Service with its comprehensive telecommunications facilities provide the means for effecting the required exchange.

42. It should be noted that the two questions of networks design and exchange of data do not have internationally agreed concepts. The Commission for Hydrological Meteorology of the WMO has looked into those two questions during its first session Washington 1961 and could not reach a conclusion and decided therefore to establish Working Groups to study them.

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